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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/799,101	03/12/2004	Lothar Benedict Erhard Josef Moeller	Moeller 20-10	7666
46363 7590 06/07/2007 PATTERSON & SHERIDAN, LLP/ LUCENT TECHNOLOGIES, INC 595 SHREWSBURY AVENUE SHREWSBURY, NJ 07702			EXAMINER LIU, LI	
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

# Office Action Summary

Application No.

10/799,101

Applicant(s)

MOELLER ET AL.

Examiner

Li Liu

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 20 March 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-9 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on 12 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>3/20/2007</u> .   | 6) <input type="checkbox"/> Other: _____                          |

## DETAILED ACTION

### *Response to Arguments*

1. Applicant's arguments filed on March 20 2007 have been fully considered but they are not persuasive. The examiner has thoroughly reviewed Applicant's arguments but firmly believes that the cited reference reasonably and properly meet the claimed limitation as rejected.

1). Applicant's argument – "neither Zheng, Hayee nor Lee provides motivation to combine these references", "Zheng and Hayee teach away from combining Zheng with Hayee's RZ modulation",

Examiner's response – Zheng et al discloses that by optimizing the optical filter and the electrical filter **in the receiver**, the sensitivity of the optical duobinary can be improved greatly; meanwhile, the high dispersion tolerance nature of the optical duobinary signal will not be degrade. Zheng et al investigates the 40 Gb/s NRZ duobinary signal, and admits that the dispersion tolerance is the most important factor for the 40 Gb/s optical duobinary signal.

However, as disclosed by Hayee et al, for 10 Gb/s and 20 Gb/s system (note: the applicant presents a 10 Gb/s system), the nonlinearity dominates; then, a RZ signal is preferred and operates better (Hayee: ABSTRACT).

Therefore, for a 10 Gb/s system, a RZ duobinary signal should be used. But, the RZ duobinary signal is more affected by dispersion.

Since Zheng et al teaches a method to optimize the optical filter **at the receiver side** to improve the dispersion tolerance, it is obvious that an optimized optical filter can

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be used in the receiver as taught by Zheng et al so to improve the dispersion tolerance for 10 Gb/s RZ signal. That is, the combination of Zheng et al and Hayee et al will make the 10 Gb/s duobinary RZ system tolerate both the nonlinearity and the dispersion. For 10 Gb/s system, Zheng and Hayee do not teach away from combining Zheng with Hayee's RZ modulation.

2). Applicant's argument – "Further more, even if one were to combine RZ-duobinary with the use of a filter in the receiver, it is not obvious that such a system would necessarily be functional. .... Since nonlinearities in the transmission fiber can affect the phase relationships in the signal, one cannot assume that the integrity of the transmitted signal can be sufficiently maintained for the use of the narrower band filter in the receiver".

Examiner's response – the applicant does not disclose or claim what specific techniques are used to assure that the integrity of the transmitted signal is sufficiently maintained for the use of the narrower band filter in the receiver. And the applicant even does not disclose the exact bandwidth of the low pass electrical filter in the transmitter and the bandwidth of the electrical filter at the receiver. As disclosed by Hayee et al and Zheng et al, the RZ modulation format can be used for better tolerant of nonlinear effect, and the optimized optical filter and electrical filter can be used at the receiver side for better tolerant of dispersion; and Hayee et al further investigates channel power dependant of the nonlinearity. Therefore, "the integrity of the transmitted signal can be sufficiently maintained for the use of the narrower band filter in the receiver".

***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zheng (X. Zheng et al: "Receiver Optimization for 40-Gb/s Optical Duobinary Signal", IEEE Photonics Technology Letters, Vol. 13, No. 7, July 2001, page 744-746) in view of Hayee et al (M. Hayee: "NRZ Versus RZ in 10-40-Gb/s Dispersion-Managed WDM Transmission Systems", IEEE Photonics Technology Letters, Vol. 11, No. 8, August 1999, page 991-993) and Lee et al (US 2004/0101314).

1). With regard to claim 1, Zheng et al discloses an optical receiver (Figure 1, OF, O/E and EF, page 744 right column, II. Simulation Model) for receiving a duobinary optical signal at a bit rate B bits per second, the receiver comprising:

an optical bandpass filter (OF in Figure 1) responsive to the duobinary optical signal for filtering the signal within a passband of B Hz (Figure 1, 40-Gb/s duobinary system, OF 40 GHz in Figure 2b, page 745 right column second paragraph: a narrow optical filter can improve sensitivity effectively; page 746, right column, first paragraph: the optimum bandwidth of the optical filter is around 40 GHz); and

an optical detector (O/E in Figure 1) for recovering data from the filtered duobinary optical signal.

But Zheng et al does not disclose that the duobinary optical signal is an **RZ**-duobinary optical signal.

It is well known that the NRZ signal can tolerate more chromatic **dispersion** than RZ. However, as admitted by the applicant, the prior art has demonstrated that the RZ-duobinary signal is more tolerant to fiber **nonlinearities**. Hayee et al, in the same field of endeavor, discloses that the RZ is less affected by nonlinearity than NRZ (Figure 4(a)-(c)), but RZ system is more susceptible to dispersion than NRZ due to RZ high modulation bandwidth. And Lee et al discloses an RZ-duobinary transmitter (Figures 1 and 3).

Zheng et al uses a narrow optical filter at the receiver side to improve the dispersion tolerance (Figure 4) and filter the ASE noise; and under the optimum conditions, the sensitivity of optical duobinary signal can be improved greatly (page 746, IV. CONCLUSION). Hayee et al shows RZ modulation has better tolerance to **nonlinearity** for a 10 Gb/s system, and Lee et al teaches an RZ-duobinary transmitter, and Zheng et al demonstrate that a narrow optical filter in the receiver improves the **dispersion** tolerance.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the RZ-duobinary modulation as taught by Hayee et al and Lee et al to the system of Zheng et al so that both nonlinearity tolerance and dispersion tolerance can be improved for a 10 Gb/s RZ system, and also the ASE noise can be reduced by the narrow optical filter.

2). With regard to claim 2, Zheng in view of Hayee et al and Lee et al discloses all of the subject matter as applied to claim 1 above. And Zheng et al further discloses wherein a center frequency of the optical bandpass filter can be detuned from a center frequency of the RZ-duobinary optical signal by an amount less than or equal to  $\pm 0.1 \times B$  (Zheng et al discloses that the optimum bandwidth of the optical filter is around 40 GHz; when detuned by 4 GHz, one side of the filter is about 16 GHz from the carrier and another side is about 24 GHz from the carrier. The applicant uses a 2<sup>nd</sup>-order super-Gaussian filter and Zheng et al uses a third-order Bessel filter, both filters have relatively flat top, therefore, the performance of the detuned filter is equivalent to a filter with a bandwidth between 32 GHz and 48 GHz; based on Figures 2b and 4, optical filters with different bandwidth are tested, as the optical filter  $\geq 32$  GHz and  $\leq 48$  GHz, the sensitivity is still around  $-33 \text{ dBm} \pm 0.3 \text{ dBm}$ , the benefits is substantial).

3). With regard to claim 3, Zheng et al discloses an optical receiver (Figure 1, OF, O/E and EF, page 744 right column, II. Simulation Model) for receiving an duobinary optical signal at a bit rate B bits per second, the receiver comprising:

an optical bandpass filter (OF in Figure 1) responsive to the duobinary optical signal for filtering the signal within a passband having a bandwidth greater than or equal to  $0.7 \times B$  Hz (30 GHz in Figure 2b) and less than or equal to  $1.3 \times B$  Hz (Figures 2b and 4, optical filters with different bandwidth are tested, as the optical filter  $> 30$  GHz and  $< 50$  GHz, the sensitivity is still around  $-33 \text{ dBm} \pm 0.5 \text{ dBm}$ , the benefits is still substantial compared with the OF 100 GHz); and

an optical detector (O/E in Figure 1) for recovering data from the filtered duobinary optical signal.

But Zheng et al does not disclose that the duobinary optical signal is an **RZ**-duobinary optical signal.

It is well known that the NRZ signal can tolerate more chromatic **dispersion** than RZ. However, as admitted by the applicant, the prior art has demonstrated that the RZ-duobinary signal is more tolerant to fiber **nonlinearities**. Hayee et al, in the same field of endeavor, discloses that the RZ is less affected by nonlinearity than NRZ (Figure 4(a)-(c)), but RZ systems is more susceptible to dispersion than NRZ due to RZ high modulation bandwidth. And Lee et al discloses an RZ-duobinary transmitter (Figures 1 and 3).

Zheng et al uses a narrow optical filter at the receiver side to improve the dispersion tolerance (Figure 4) and filter the ASE noise; and under the optimum conditions, the sensitivity of optical duobinary signal can be improved greatly (page 746, IV. CONCLUSION). Hayee et al shows RZ modulation has better tolerance to **nonlinearity** for a 10 Gb/s system, and Lee et teaches an RZ-duobinary transmitter, and Zheng et al demonstrate that a narrow optical filter in the receiver improves the **dispersion** tolerance.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the RZ-duobinary modulation as taught by Hayee et al and Lee et al to the system of Zheng et al so that both nonlinearity

tolerance and dispersion tolerance can be improved for a 10 Gb/s RZ system, and also the ASE noise can be reduced by the narrow optical filter.

4). With regard to claim 4, Zheng et al discloses a method for receiving a duobinary optical signal (Figure 1, OF, O/E and EF, page 744 right column, II. Simulation Model) having a data bit rate of B bits per second, the method comprising the steps of:

bandpass filtering (OF in Figure 1) the signal through a passband substantially equal to B Hz (Figure 1, 40-Gb/s duobinary system, OF 40 GHz in Figure 2b, page 745 right column second paragraph: a narrow optical filter can improve sensitivity effectively, page 746, right column, first paragraph: the optimum bandwidth of the optical filter is around 40 GHz); and

recovering data (O/E in Figure 1) from the filtered signal, wherein the signal conforms to an duobinary signaling format.

But Zheng et al does not disclose that the duobinary signal format is an **RZ**-duobinary signaling format.

It is well known that the NRZ signal can tolerate more chromatic **dispersion** than RZ. However, as admitted by the applicant, the prior art has demonstrated that the RZ-duobinary signal is more tolerant to fiber **nonlinearities**. Hayee et al, in the same field of endeavor, discloses that the RZ is less affected by nonlinearity than NRZ (Figure 4(a)-(c)), but RZ systems is more susceptible to dispersion than NRZ duo to RZ high modulation bandwidth. And Lee et al discloses an RZ-dubinary transmitter (Figures 1 and 3).

Zheng et al uses a narrow optical filter at the receiver side to improve the dispersion tolerance (Figure 4) and filter the ASE noise; and under the optimum conditions, the sensitivity of optical duobinary signal can be improved greatly (page 746, IV. CONCLUSION). Hayee et al shows RZ modulation has better tolerance to **nonlinearity** for a 10 Gb/s system, and Lee et teaches an RZ-duobinary transmitter, and Zheng et al demonstrate that an narrow optical filter in the receiver improves the **dispersion** tolerance.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the RZ-duobinary modulation as taught by Hayee et al and Lee et al to the system of Zheng et al so that both nonlinearity tolerance and dispersion tolerance can be improved for a 10 Gb/s RZ system, and also the ASE noise can be reduced by the narrow optical filter.

5). With regard to claim 5, Zheng in view of Hayee et al and Lee et al discloses all of the subject matter as applied to claim 4 above. And Zheng et al further discloses wherein a center frequency of the optical bandpass filter can be detuned from a center frequency of the RZ-duobinary optical signal by an amount less than or equal to  $\pm 0.1 \times B$  (Zheng et al discloses that the optimum bandwidth of the optical filter is around 40 GHz; when detuned by 4 GHz, one side of the filter is about 16 GHz from the carrier and another side is about 24 GHz from the carrier. The applicant uses a 2<sup>nd</sup>-order super-Gaussian filter and Zheng et al uses a third-order Bessel filter, both filters have relatively flat top, therefore, the performance of the detuned filter is equivalent to the a filter with a bandwidth between 32 GHz and 48 GHz; based on Figures 2b and 4, optical

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filters with different bandwidth are tested, as the optical filter  $\geq 32$  GHz and  $\leq 48$  GHz, the sensitivity is still around  $-33 \text{ dBm} \pm 0.3 \text{ dBm}$ , the benefits is substantial).

6). With regard to claim 6, Zheng et al discloses a method for receiving a duobinary optical signal having a data bit rate of B bits per second, the method comprising the steps of:

bandpass filtering (OF in Figure 1) the signal through a passband having a bandwidth greater than or equal to  $0.7 \cdot B$  Hz and less than or equal to  $1.3 \cdot B$  Hz (Figures 2b and 4, optical filters with different bandwidth are tested, as the optical filter  $> 30$  GHz and  $< 50$  GHz, the sensitivity is still around  $-33 \text{ dBm} \pm 0.5 \text{ dBm}$ , the benefits is still substantial compared with the OF 100 GHz); and

recovering data (O/E in Figure 1) from the filtered signal, wherein the signal conforms to a duobinary signaling format.

But Zheng et al does not disclose that the duobinary signaling format is an **RZ**-duobinary signaling format.

It is well known that the NRZ signal can tolerate more chromatic **dispersion** than RZ. However, as admitted by the applicant, the prior art has demonstrated that the RZ-duobinary signal is more tolerant to fiber **nonlinearities**. Hayee et al, in the same field of endeavor, discloses that the RZ is less affected by nonlinearity than NRZ (Figure 4(a)-(c)), but RZ systems is more susceptible to dispersion than NRZ duo to RZ high modulation bandwidth. And Lee et al discloses an RZ-dubinary transmitter (Figures 1 and 3).

Zheng et al uses a narrow optical filter at the receiver side to improve the dispersion tolerance (Figure 4) and filter the ASE noise; and under the optimum conditions, the sensitivity of optical duobinary signal can be improved greatly (page 746, IV. CONCLUSION). Hayee et al shows RZ modulation has better tolerance to **nonlinearity** for a 10 Gb/s system, and Lee et teaches an RZ-duobinary transmitter, and Zheng et al demonstrate that an narrow optical filter in the receiver improves the **dispersion** tolerance.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the RZ-duobinary modulation as taught by Hayee et al and Lee et al to the system of Zheng et al so that both nonlinearity tolerance and dispersion tolerance can be improved for a 10 Gb/s RZ system, and also the ASE noise can be reduced by the narrow optical filter.

7). With regard to claim 7, Zheng et al discloses an optical transmission system comprising:

- an optical transmitter (Figure 1, page 744 right column II. Simulation Model) for generating a duobinary optical signal at a bit rate B bits per second;

- an optical transmission medium (Figure 1, NZ-DSF fiber) coupled to the optical transmitter for supporting propagation the duobinary optical signal;

- an optical bandpass filter (OF in Figure 1) coupled to an output of the optical transmission medium and being responsive to the duobinary optical signal for filtering the signal within a passband of B Hz (Figure 1, 40-Gb/s duobinary system, OF 40 GHz in Figure 2b, page 745 right column second paragraph: a narrow optical filter can

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improve sensitivity effectively; page 746, right column, first paragraph: the optimum bandwidth of the optical filter is around 40 GHz); and

an optical detector (O/E in Figure 1) for recovering data from the filtered RZ-duobinary optical signal.

But Zheng et al does not disclose that the duobinary optical signal is an **RZ**-duobinary optical signal.

It is well known that the NRZ signal can tolerate more chromatic **dispersion** than RZ. However, as admitted by the applicant, the prior art has demonstrated that the RZ-duobinary signal is more tolerant to fiber **nonlinearities**. Hayee et al, in the same field of endeavor, discloses that the RZ is less affected by nonlinearity than NRZ (Figure 4(a)-(c)), but RZ systems is more susceptible to dispersion than NRZ due to RZ high modulation bandwidth. And Lee et al discloses an RZ-duobinary transmitter (Figures 1 and 3).

Zheng et al uses a narrow optical filter at the receiver side to improve the dispersion tolerance (Figure 4) and filter the ASE noise; and under the optimum conditions, the sensitivity of optical duobinary signal can be improved greatly (page 746, IV. CONCLUSION). Hayee et al shows RZ modulation has better tolerance to **nonlinearity** for a 10 Gb/s system, and Lee et teaches an RZ-duobinary transmitter, and Zheng et al demonstrate that a narrow optical filter in the receiver improves the **dispersion** tolerance.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the RZ-duobinary modulation as taught by

Hayee et al and Lee et al to the system of Zheng et al so that both nonlinearity tolerance and dispersion tolerance can be improved for a 10 Gb/s RZ system, and also the ASE noise can be reduced by the narrow optical filter.

8). With regard to claim 8, Zheng in view of Hayee et al and Lee et al discloses all of the subject matter as applied to claim 7 above. And Zheng et al further discloses wherein a center frequency of the optical bandpass filter can be detuned from a center frequency of the RZ-duobinary optical signal by an amount less than or equal to  $\pm 0.1 \times B$  (Zheng et al discloses that the optimum bandwidth of the optical filter is around 40 GHz; when detuned by 4 GHz, one side of the filter is about 16 GHz from the carrier and another side is about 24 GHz from the carrier. The applicant uses a 2<sup>nd</sup>-order super-Gaussian filter and Zheng et al uses a third-order Bessel filter, both filters have relatively flat top, therefore, the performance of the detuned filter is equivalent to the a filter with a bandwidth between 32 GHz and 48 GHz; based on Figures 2b and 4, optical filters with different bandwidth are tested, as the optical filter  $\geq 32$  GHz and  $\leq 48$  GHz, the sensitivity is still around  $-33 \text{ dBm} \pm 0.3 \text{ dBm}$ , the benefits is substantial).

9). With regard to claim 9, Zheng et al discloses an optical transmission system comprising:

an optical transmitter (Figure 1, page 744 right column II. Simulation Model) for generating a duobinary optical signal at a bit rate B bits per second;

an optical transmission medium (Figure 1, NZ-DSF fiber) coupled to the optical transmitter for supporting propagation the duobinary optical signal;

an optical bandpass filter (OF in Figure 1) coupled to an output of the optical transmission medium and being responsive to the duobinary optical signal for filtering the signal within a passband having a bandwidth greater than or equal to  $0.7 \times B$  Hz and less than or equal to  $1.3 \times B$  Hz (Figures 2b and 4, optical filters with different bandwidth are tested, as the optical filter  $> 30$  GHz and  $< 50$  GHz, the sensitivity is still around  $-33$  dBm  $\pm 0.5$  dBm, the benefits is still substantial compared with the OF 100 GHz); and

an optical detector (O/E in Figure 1) for recovering data from the filtered duobinary optical signal.

But Zheng et al does not disclose that the duobinary optical signal is an **RZ**-duobinary optical signal.

It is well known that the NRZ signal can tolerate more chromatic **dispersion** than RZ. However, as admitted by the applicant, the prior art has demonstrated that the RZ-duobinary signal is more tolerant to fiber **nonlinearities**. Hayee et al, in the same field of endeavor, discloses that the RZ is less affected by nonlinearity than NRZ (Figure 4(a)-(c)), but RZ systems is more susceptible to dispersion than NRZ due to RZ high modulation bandwidth. And Lee et al discloses an RZ-duobinary transmitter (Figures 1 and 3).

Zheng et al uses a narrow optical filter at the receiver side to improve the dispersion tolerance (Figure 4) and filter the ASE noise; and under the optimum conditions, the sensitivity of optical duobinary signal can be improved greatly (page 746, IV. CONCLUSION). Hayee et al shows RZ modulation has better tolerance to **nonlinearity** for a 10 Gb/s system, and Lee et teaches an RZ-duobinary transmitter,

and Zheng et al demonstrate that an narrow optical filter in the receiver improves the **dispersion** tolerance.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the RZ-duobinary modulation as taught by Hayee et al and Lee et al to the system of Zheng et al so that both nonlinearity tolerance and dispersion tolerance can be improved for a 10 Gb/s RZ system, and also the ASE noise can be reduced by the narrow optical filter.

### ***Conclusion***

3. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Wei et al (X. Wei: "Nonlinearity tolerance of RZ-AMI format in 42.7 Gbit/s long-haul transmission over standard SMF Spans", ELECTRONICS LETTERS, October 2, 2003, Vol. 39, No. 20, page 1459-1460).

Lyubomirsky (I. Lyubomirsky: "Experimental Demonstration of an Optimized Optical RZ-Duobinary Transmission System", IEEE Photonics Technology Letters, Vol. 17, No. 12, December 2005, page 2757-2759).

Miyamoto et al (US 2003/0002121) discloses an RZ-duobinary system with an optical filter at the receiver.

4. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Li Liu whose telephone number is (571)270-1084. The examiner can normally be reached on Mon-Fri, 8:00 am - 5:30 pm, alternating Fri off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ken Vanderpuye can be reached on (571)272-3078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Li Liu  
June 3, 2007

  
KENNETH VANDERPUYE  
SUPERVISORY PATENT EXAMINER